

CLAIMS:

1. A surgical operation device comprising a master that detects movement of a body of an operator and a slave that performs surgery on tissue by moving in accordance with information on the detected movement of the body of the operator, the information supplied from the master, the slave comprising a holder for holding an operation appliance or an affected area, wherein:

when an orthogonal coordinate system in a space is formed of XYZ coordinate axes, the master comprises:

an distal operation section that is to be held by a finger of the operator;

a first sensor that detects a pressure applied on the distal operation section by the finger of the operator;

a second sensor that detects movement of the distal operation section along an orientation of an X-axis;

a third sensor that detects movement of the distal operation section along an orientation of a Y-axis;

a fourth sensor that detects movement of the distal operation section in along an orientation of a Z-axis;

a fifth sensor that detects rotation of the distal operation section about the Z-axis;

a sixth sensor that detects flexion/extension of a wrist of the operator;

a seventh sensor that detects ulnar/radial deviation of the wrist of the operator; and

an eighth sensor that detects rotation of the wrist of the operator; and

when an orientation of forward/backward movement of the holder is indicated by Z'-axis, and axes each of which are orthogonal to the Z'-axis are indicated by an X'-axis and a

Y'-axis, the X'Y'Z' coordinate axes being an orthogonal coordinate system,

the slave comprises an arm supporting the holder;

the holder comprises a nipping section for pinching an operation appliance or an affected area, and a base section supporting the nipping section;

the nipping section increases/reduces a degree of pinching in reaction to the pressure applied to the distal operation section and detected by the first sensor;

the base section moves respectively along orientations of the X', Y', and/or Z' axes corresponding to respective movement amounts detected by the second sensor to the fourth sensor, and rotates about the Z'-axis corresponding to a rotation amount detected by the fifth sensor; and

the arm rotates on respective joints in the arm corresponding to amount and orientation of movement detected by the sixth sensor and by the seventh sensor, and rotates on an inner axis in accordance with a rotation amount detected by the eighth sensor.

2. A surgical operation device as set forth in Claim 1 wherein the second sensor to the fourth sensor are torque sensors.

3. A surgical operation device as set forth in Claim 2, further comprising a calculation section that converts torque measured by the torque sensors into movement amounts of respective sections of the slave, by using designated movement ratios.

4. A surgical operation device as set forth in Claim 3 wherein the movement ratios in the calculation section are

variable.

5. A surgical operation device as set forth in Claim 4 wherein the movement ratios vary in different sections of the slave.

6. A surgical operation device as set forth in Claim 1 wherein the distal operation section is pen-shaped.

7. A surgical operation device as set forth in Claim 1 wherein the first sensor to the eighth sensor are disposed on an operator-worn glove shaped in such a way as to cover the wrist of the operator and expose the finger of the operator.

8. A surgical operation device as set forth in Claim 1 wherein the eighth sensor is disposed on an operator-worn glove that is shaped in such a way as to cover the wrist of the operator and expose the finger of the operator, and the eighth sensor measures rotation amount of the operator-worn glove with respect to a forearm-cover covering a forearm of the operator.

9. A surgical operation device as set forth in Claim 1 wherein the nipping section opens and closes so as to pinch the operation appliance.

10. A surgical operation device as set forth in Claim 9 wherein the operation appliance is a suture needle.

11. A surgical operation device as set forth in Claim 1 wherein the nipping section opens and closes so as to pinch the affected area.

12. A surgical operation device as set forth in Claim 1 wherein the base section rotates and moves at least ± 30 degrees horizontally on an inner joint, corresponding to the movement amount detected by the second sensor.

13. A surgical operation device as set forth in Claim 1 wherein the base section rotates and moves at least minus 45 degrees to plus 70 degrees vertically on an inner joint, corresponding to the movement amount detected by the third sensor.

14. A surgical operation device as set forth in Claim 1 wherein the base section extends at least 5 cm parallel to an axis connecting two inner points, corresponding to the movement amount detected by the fourth sensor.

15. A surgical operation device as set forth in Claim 1 wherein the base section rotates 180 degrees on an axis connecting two inner points, corresponding to the rotation amount detected by the fifth sensor.

16. A surgical operation device as set forth in Claim 1 wherein the arm rotates at least minus 30 degrees to plus 70 degrees vertically on an inner joint, corresponding to the amount and orientation of the movement detected by the sixth sensor.

17. A surgical operation device as set forth in Claim 1 wherein the arm rotates at least 25 degrees in radial deviation and 55 degrees in ulnar deviation on an inner joint, corresponding to the movement amount and movement

orientation both of which have been detected by the seventh sensor.

18. A surgical operation device as set forth in Claim 1 wherein the arm rotates 180 degrees on an axis connecting two inner joints, corresponding to the rotation amount detected by the eighth sensor.